CLEAN VERSION OF PENDING CLAIMS

1. A plasma processing apparatus for processing a substrate, comprising:

a process chamber, defined at least in part by a wall, within which a plasma is ignited and sustained for said processing;

a magnetic array having a plurality of magnetic elements that are disposed around the periphery of said process chamber, said plurality of magnetic elements being configured to produce a magnetic field establishing a plurality of cusp patterns on said wall; and

a device for changing said cusp pattern with respect to said wall connected between the plurality of magnetic elements and the process chamber.

2. The apparatus, as recited in claim 1, further comprising a chuck within the process chamber for supporting the substrate within the process chamber.

3. The apparatus, as recited in claim 2, wherein the magnetic field has an azimuthally symmetric radial gradient.

4. The apparatus, as recited in claim 3, wherein said magnetic elements are permanent magnets.

5. The apparatus, as recited in claim 3, wherein said magnetic elements are electromagnets.

6. The apparatus, as recited in claim 3, wherein said device for changing said cusp pattern continuously changes the cusp pattern on said wall.

7. The apparatus, as recited in claim 3, wherein said device for changing said cusp pattern incrementally changes the cusp pattern on said wall.

8. The apparatus, as recited in claim 3, wherein said device for changing said cusp pattern comprises a device for moving at least one of said magnetic elements.

9. The apparatus, as recited in claim 8, wherein said device for moving at least one of said magnetic elements comprises a device for moving a plurality of said plurality of magnetic elements individually.

10. (Once Amended) The apparatus, as recited in claim 9, wherein said device for moving said plurality of magnetic elements comprises a device for rotating said plurality of magnetic elements in an alternating pattern.

11. (Once Amended) The apparatus, as recited in claim 9, wherein said device for moving said plurality of said magnetic elements comprises a device for rotating said magnetic elements in a same direction.

12. The apparatus, as recited in claim 8, wherein said device for moving at least one of said magnetic elements comprises a device for moving said array as a unit relative to said process chamber.

13. The apparatus, as recited in claim 12, wherein said device for moving said magnetic array comprises a device for rotating said array around said chamber.

14. The apparatus, as recited in claim 12, wherein said device for moving said magnetic array comprises a device for moving said array closer and farther away from said chamber.

15. The apparatus, as recited in claim 2, wherein said device for changing said cusp pattern comprises a device for moving at least part of said chamber wall within said magnetic field.

16. The apparatus of claim 15 wherein said device for moving at least part of said chamber wall comprises a device for rotating said chamber wall within said magnetic field.

17. The apparatus, as recited in claim 15, wherein said device for moving at least part of said chamber wall comprises a device for moving a part of the chamber wall that is an inner chamber wall forming a liner.

18. The apparatus, as recited in claim 2, wherein said device for changing said cusp pattern comprises a device for moving at least part of a flux plate assembly within said magnetic field.

19. (Cancelled)

20. (Cancelled)

21. (Cancelled)

22. (Cancelled)

23. (Cancelled)

24. (Cancelled)

25. (Cancelled)

26. (Cancelled)

27. (Cancelled)

28. (New) A plasma processing apparatus for processing a substrate, comprising:

a process chamber, defined at least in part by a wall, within which a plasma is ignited and sustained for said processing;

a magnetic array having a plurality of magnetic elements that are disposed around the periphery of said process chamber, said plurality of magnetic elements being configured to produce an azimuthally symmetric radial gradient magnetic field establishing a plurality of cusp patterns on said wall; and

a device for moving said cusp patterns with respect to said wall connected between the plurality of magnetic elements and the process chamber.

29. (New) The plasma processing apparatus, as recited in claim 28, wherein each magnetic element is axially oriented about the periphery of the process chamber.

30. (New) The plasma processing apparatus, as recited in claim 29, wherein the device for changing said cusp patterns comprises a device for rotating at least one magnetic element of the plurality of magnetic elements around a rotation axis, which passes through the at least one magnetic element.

31. (New) The plasma processing apparatus, as recited in claim 30, wherein the plurality of magnetic elements create a stronger magnetic field at the wall and a weaker magnetic field above the substrate.

32. (New) The plasma processing apparatus, as recited in claim 31, wherein the weaker magnetic field above the substrate is about zero Gauss and the stronger magnetic field at the wall is between about 15 to about 1500 Gauss.

33. (New) The plasma processing apparatus, as recited in claim 30, wherein the plurality of magnetic elements are permanent magnets.

34. (New) The plasma processing apparatus, as recited in claim 30, wherein the process chamber has a chamber axis that extends across a height of the process chamber, and wherein the rotation axis of the at least one magnetic element is parallel to the chamber axis.

A2 Cont

35. (New) The plasma processing apparatus, as recited in claim 28, wherein each magnetic element comprises a north magnetic pole and a south magnetic pole, wherein the north magnetic pole and the south magnetic pole of each magnetic element is aligned to face a magnetic pole of an adjacent magnetic element along a circumference around the process chamber, wherein the magnetic elements are disposed around said process chamber to create a azimuthally symmetric radial gradient.

36. (New) The plasma processing apparatus, as recited in claim 35, wherein the plurality of magnetic elements are permanent magnets.